Hopi Utility Corporation Memorandum *TRB 09/15/2018*

TO: Indian Health Service AZ EDO

RE: HAMP Preliminary Design 07/2017

File: HAMP Preliminary Design

ATTN: Jesse De Couteau

Responses from Jesse DeCoteau are in italics.

Thanks for the opportunity to review the HAMP preliminary design dated 07/2017.

Request for additional Information:

a) What does IHS recommend to verify the current water quality and casing condition of the dormant wells TT #2 and TT #3?
Nothing is recommended at this time. Eric Matson is going to follow up with the hydrogeologists to see if they would recommend anything. To date, nothing has happened to suggest anything has changed from the reports produced by John Shomaker & Associates, Inc.

b) Why 100 HP pumps? The projected pumping rate based on 2014 PER and validated by 2013 to 2016 USGS well records is 140 GPM in 2018 and 200 GPM 2035. Could a lower pumping rate and increased daily pumping duration induce less stress on the aquifer, well head facilities and decrease pump start power demand ?
The 100HP pumps are per the Preliminary Engineering Report (PER) for funding purposes. This is an item that can, and will be, evaluated during the preparation of construction documents when the project is funded.

c) Could a higher head, lower flow rate pump installation provide an increased potential head advantage at a downstream storage location?
The 100HP pumps are per the PER for funding purposes. This is an item that can, and will be, evaluated during the preparation of construction documents when the project is funded.

d) What would the velocity of an 8 inch diameter in lieu of 12 inch diameter pipe in the initial transmission trunk be with the alternative design lower pumping rate?
This is an item that can, and will be, evaluated during the preparation of construction documents when the project is funded.

e) A proposed water storage tank at TT #3 is inferred in the process flow diagram but omitted in the plan view description tag. A tank at this location may be preferred to an inline pump to reduce surge; however, it would also reduce potential head. What size and elevation of storage tank is proposed at this location?
A water storage tank is not included in the PER. Instead, booster pumps are scoped to be in series with the well pumps. I would prefer water storage at the well sites, but now is not an appropriate time to add something that is not part of the PER. If added, I think

the water storage tank(s) could be small (e.g. 20,000 gallons per each well), with a footprint that does not exceed what is environmentally cleared at the well sites. The water storage tank(s) primary purpose(s) would be to minimize operational and maintenance issues associated with the proposed well and booster pumps. The water storage tank(s) will be omitted from future iterations of the process flow diagram unless they are added. This is an item that can, and will be, evaluated during the preparation of construction documents when the project is funded.

f) Does the longer overland and Southern Turquoise Trail Route alignment possess surface hydrology, environmental clearance or geotechnical advantages over the shorter Highway 4 Alignment proposed in Route Alternative C?
I do not understand the question. I think what you are asking is under the assumption that the alignment's only objective is to get to Second Mesa. If you are assuming that First Mesa is also to be included in the project, the BIA Route 4 alignment does not seem to be a shorter option. Another assumption that I think you are making is that all proposed water mains would be the same size and only one main would be required. Such a change may require significantly longer distances of larger diameter mains and/or may require more than one main (in parallel or different alignments) in order to serve both First and Second Mesa.

There does not seem to be much difference between what I think you are describing with respect to hydrology or geotechnical advantages. However, the preferred alignment is what is identified as part of the Environmental Assessment Finding of No Significant Impact. There are nearly-infinite different alignments that could be evaluated with respect to technical feasibility. However, the preferred alignment is what the Tribe selected years ago and changing alignments at this time would require significant revisions to most of the PER documentation and Environmental Assessment.

g) Does the preliminary design include required backflow, pressure reduction, air release and altitude valves?
Pressure reducing, air release, and altitude valves are included as specific line items in the PER. Backflow is alluded to in the PER with check valve discussions, but not specifically line itemed in cost estimates or identified in the plan set. Selection of backflow preventers would typically follow the adopted Cross Connection Control Programs of the relevant Public Water Systems (PWS)s. At this time, the IHS is not aware of any of the PWSs having implemented Cross Connection Control Programs, but now may be a good time for HUC to make such decisions on their own behalf (and maybe assist proposed consecutive PWSs do the same). These are items that can, and will be, evaluated during the preparation of construction documents when the project is funded.

h) Are proposed arrollo (intermittent creek bed), road, trail and gate crossings illustrated on the plans?

Intermittent creek beds, roads, trails, and gate crossings are not depicted on the plans. The plan set is per the PER for funding purposes and is not intended to be a for-construction plan set. These are items that can, and will be, evaluated during the preparation of construction documents when the project is funded.

i) Are potentially corrosive soils and anticipated, non rip-able rock formations (dense limestone and caliche) zones indicated on the plan view? (Harshbarger 198_).
The plan set is per the PER for funding purposes and is not intended to be a for-construction plan set. If geotechnical work is going to be performed on the alignment, it could be an expensive line item in excess of $100,000 depending on the spacing, quantity, and quality of geotechnical evaluation and report(s). It is unlikely that there will be "non rip-able" rock formations. However, the excavated rock breaks down into boulders unsuitable for pipe bedding/shading without significant mechanical processing. See also, Environmental Assessment Section 3.4 Soils. I am unclear as to what "Harshbarber 198_" is referring to. This is an item that can, and will be, evaluated during the preparation of construction documents when the project is funded.

For information, several layers of information available on Esri ArcGIS Online that could be added to plan sets may be relevant to your question (e.g. United States Department of Agriculture Natural Resources Conservation Service Soil Survey Geographic). However, such work is beyond the scope of what IHS typically depicts in PER documents of this type.

j) Does IHS preliminary design standard normally include pressure gradient profile or pipe pressure design criteria ?
No.

k) How will the design illustrated serve the cultural center and adjacent Second Mesa hinter land home sites?
The current design does not serve the cultural center nor the adjacent home sites.

l) Where are the proposed wholesale meter locations?
The proposed wholesale meter locations have not yet been established. Now that HUC is an existing Utility, that is something that can be finalized between the HUC and the consecutive PWSs that will be purchasing water wholesale. This issue is not as technical as it is an issue of ownership, operation, and maintenance.

m) Would First Mesa prefer to receive their HAMP water at the East Tank or West Tank location? Which location is recommended by IHS?
The HUC can reinitiate preferential discussions with First Mesa if that is desired at this time. The preferred alternative in the PER has the water going to the East Tank. The West Tank is lower than the East Tank. Since there are no existing ways to convey water

from the West Tank to the East Tank, conveying water to only the West Tank would not serve all of the pressure zones in the PWS.

n) Would horizontal boring under the First Mesa Ridge shoulder-less grade require additional extensive NEPA work?
Yes, if any proposed horizontal boring deviates from the Environmental Assessment.

o) The RoW width appears directly over the existing road alignment in most areas. Is there a typical roadway offset distance? Which side of the road was NEPA clearance Right of Way defined and staked upon throughout the project?
There is no Right Of Way considered in the project other than those of the Bureau of Indian Affairs (BIA) and Arizona Department of Transportation (ADOT) highways. The roadway offset distance varies depending on what part of the project is being referenced. There is no typical offset distance value used. The width of the water mains that are depicted in the preferred PER Alternative alignment are indicative of the areas cleared in the Environmental Assessment, which are generally 100 feet. See the Environmental Assessment and supporting documentation (especially Cultural Report) for specific descriptions of what was cleared per different portions of the project.

p) What is the recommended design width of the pipeline construction, erosion control and permanent maintenance easements over adjacent highway, exurban trail and overland routes?
A legal Easement nor Right Of Way were considered per direction from the Tribe. If necessary, I would suggest Construction Easement widths be 30 feet on center. Construction easements would generally correspond to the center of the widths cleared in the Environmental Assessment and supporting documentation (mostly 100 feet on center). If necessary, suggested Operation and Maintenance Easement would be 20 feet on center.

q) Will additional construction easement width be required in certain steeper sections to catch grade and revegetate slope?
Possibly, but it cannot deviate from Environmental Assessment without additional documentation.

r) What is the reference source and contour interval of the presented topographic quadrangle map and the date of capture of the ortho photo imagery?
The USGS topographic maps were provided to the IHS by the Arizona State Land Office several years ago. Said maps are for informational purposes only. The scale is such that contours are not relevant in the interest of depicting the entire HAMP scope. This could be expanded out into multiple sheets if the Tribe or HUC feel there is value in that. The contour interval is 20 feet.

The satellite aerial imagery is per the Geolocation function of AutoCAD Civil 3D 2015, which uses Bing imagery. Due to the size of the HAMP, it is likely that the capture date varies throughout the images. Rather than describe the images by capture date, it is

more appropriate to describe them by the date that they were retrieved (i.e. August 2017). These are regularly updated and are easy to update. For reference, the First Mesa imagery appears to be less than two years old based on facilities that did not exist more than two years ago. Alternatively, aerials from other sources can be used instead, but would have similar varying age issues due to large area of the HAMP. The AutoCAD Civil 3D 2015 aerials were used due to ease of addition and relatively low impact on file size for distribution.

s) What is the method of elevation measurement for the top of well head casings?
The tops of the well head casings had not been surveyed at that time. The survey points used were of the ground surface in the vicinity of the wells prior to drilling and are not indicative of the actual installed facilities.

t) What is the method and frequency of elevation, bearing and stationing measurements along the preliminary alignment?
The survey was completed with Trimble R8 GNSS receivers, Trimble TSC2 Survey Controllers, and Trimble Geomatics Office software. A local site coordinate system was used, which is similar to NAD83 Arizona State Planes, East Zone. The points were then input to AutoCAD, with AutoCAD alignments being exported to Bentley WaterCAD. Many versions of AutoCAD and WaterCAD/GEMS have been used to-date due to the duration of the project. The preliminary alignment survey generally had stationing every 500 feet with a 100 foot wide width. The 100 foot wide width generally had three points per each station. The AutoCAD files will be provided to you if you request them.

u) Does the alignment and easement width require increased definition prior to construction staking and recording easement?
The alignment requires increased definition. Easement requirements have not been considered.

v) Does IHS or USDA have preliminary design standards or guidance manual that this document is based upon?
Attached.

w) Is North illustrated true or magnetic and degree of inclination?
The North illustrated is Grid North in NAD83 Arizona State Planes, East Zone and is therefore neither True nor Magnetic North.

x) Illustrate District 6 and other pertinent but non-controversial boundaries?
The District 6 Boundary that was provided to IHS by HUC in shape files could be added to the drawings. However, the District 6 Boundary does not seem relevant since all proposed HAMP facilities are within District 6. The only exception would be a power line extension from the Navajo Tribal Utility Authority (NTUA) across the Navajo Reservation, which the Tribe and HUC are handling outside the purview of the IHS and

Environmental Assessment process. Any other desired information (e.g. power line extension, range units, non-controversial boundaries, etc.) can be added if the information is provided to IHS.

For our enlightenment and your consideration,

Regards,